



The mean places of the stars in the *Nautical Almanac* for 1880 have been derived from the Greenwich Catalogues for 1860 and 1864, and for the stars not therein contained from the Cape Catalogue of 1,159 Stars, the first Melbourne General Catalogue, and the Cape Separate Catalogues 1871-3, and hence it would appear that the Greenwich Ten-year Catalogue places arranged in order of right ascension do not agree with those derived from the 1860 and 1864 Catalogues as given in the *N. A.*

The following comparison between the *N.A.* star places for 1880 and 1890 was made in order to compare the 1860, 1864, and 1872 Greenwich Catalogues together (the *N.A.* star places for 1890 depending on the 1872 Catalogue). The stars used in this comparison are those only which were used in Mr. Stone's paper, and the precession, secular variation, and proper motions have been taken from the Ten-year Catalogue.

The other two comparisons are obtained indirectly from the last and former comparisons.

	h h 0-6.	h h 6-12.	h h 12-18.	h h 18-24.	Mean.
<i>N. A.</i> , 1880— <i>N. A.</i> , 1890 ...	... +".13	".00	+"18	+"12	+"11
Greenwich Cat., 1880— <i>N. A.</i> , 1880	-.19	+.10	+.39	+.17	+.12
Greenwich Cat., 1880— <i>N. A.</i> , 1890	-.06	+.10	+.57	+.29	+.22

From these results it would appear that the Mean North Polar distances of stars in the *Nautical Almanacs* for 1880 and 1890, which are derived from the Greenwich Catalogues for 1860, 1864, and 1872, are liable to a periodic error when arranged in order of right ascension, and that this error (probably largely due to the differences of the adopted proper motions) has been eliminated in the Ten-year Catalogue for 1880.

#### Approximate Proper Motions of some Groombridge Stars. By W. Grasett Thackeray.

The following Groombridge stars, which have been observed at Greenwich since 1876, and for which no proper motions are known to have been determined, were found to have proper motions either of at least  $0.1^{\circ}$  in right ascension or  $0.^{\circ}1$  in north polar distance. The proper motions have been provision-

ally determined by taking the places as given in the Radcliffe Catalogue for 1845 for the Groombridge and Radcliffe observations, and by reducing the Greenwich observations back to the year 1845 by applying the secular variation to the precessions given in the ten-year or annual catalogues.

The results, which are only meant to call attention to the fact that the star-places are liable to sensible errors when brought up from some years back, have been given both from the comparison of the Groombridge and Radcliffe places, and of the Radcliffe and Greenwich places, and are not sufficiently accurate to be appreciably affected by the difference between Bessel's and Struve's precessions. The results are in many cases more accordant than might have been expected :—

Groombridge Nos.	Proper Motion in Right Ascension. Groombridge and Radcliffe. s s	Proper Motion in North Polar Distance. Radcliffe and Greenwich. s s	Groombridge Nos.	Proper Motion in Right Ascension. Groombridge and Radcliffe. s s	Proper Motion in North Polar Distance. Radcliffe and Greenwich. s s
9	+ 10. +	- 10. -	1775	- 10. -	- 12. -
11	+ 10. +	- 10. +	1781	... ...	+ 11. -
30	+ 10. +	- 10. +	1930	+ 02. +	- 10. -
145	+ 08. +	- 08. +	1971	- 03. -	+ 02. +
356	+ 02. +	- 02. +	1972	- 02. -	- 04. -
628	+ 02. +	- 02. +	2044	- 10. -	+ 05. +
706	+ 02. +	- 02. +	2089	... ...	+ 01. +
717	- 10. -	- 10. -	2141	... ...	- 21. -
752	+ 10. +	- 10. +	2196	+ 26. +	+ 23. +
757	... ...	- 10. -	2391	+ 05. +	- 17. -
762	+ 06. +	- 04. +	2527	+ 02. +	- 21. -
828	... ...	+ 15. +	2538	- 10. -	- 02. -
936	... ...	+ 11. +	2571	- 02. -	- 21. -
1178	+ 02. +	- 10. +	2580	+ 10. +	- 12. -
1209	... ...	+ 10. +	2867	+ 10. +	- 32. -
1214	+ 10. +	... ...	3249	+ 10. +	+ 26. +
1216	+ 02. +	- 10. +	3263	... ...	- 19. -
1228	+ 02. +	- 02. +	3295	+ 10. +	+ 13. +
1281	+ 10. +	... ...	3409	- 10. -	+ 09. +
1400	+ 05. +	- 03. -	3636	+ 02. +	- 07. -
1482	+ 10. +	- 18. -	3703	+ 02. +	- 05. -
1517	+ 02. +	- 01. +	3882	+ 02. +	- 06. +
1527	- 07. -	- 10. -	3904	+ 02. +	- 12. -
1668	... ...	- 13. +	4177	... ...	- 24. -

*The Perturbations of Sappho (80).* By Robert Bryant, B.A., D.Sc.

The following values of the perturbations of *Sappho* form a continuation of those previously published by me. As previously, the elements have been corrected for the effect of perturbation every forty days. Great pressure of other matters has prevented me from preparing for the time of the opposition of this planet in 1889 an ephemeris such as will be required for the reduction of the observations for determining its parallax. I have partially revised my previous work on the orbit of this planet. Dr. Otto Knopf has pointed out to me errors in some of the normal places, in correcting some of which a better representation of the observations is obtained. I have also found minor mistakes in the calculation of the perturbations, which must be expected when one deals single-handed with three millions of figures; but these have no great effect upon the result. I have, however, detected an error of a more serious kind. In integrating the differentials from 1872 September 7, backwards, the element of time was regarded as positive, and the sign of the result was changed before applying the correction thus found to the elements, to obtain the effect of the terms depending upon the squares and higher powers of the masses of the disturbing bodies. The perturbation of the mean longitude consists of two parts, one of which is that arising from a change in the mean motion, and depends upon a double integral, and consequently the sign of the result in this case should have been left unchanged. Unfortunately the effect of this error of sign is such that (so far as this element is concerned) the result is less accurate than if the correction had been omitted altogether.

*Disturbing Action of Venus.*

1888.	$\Delta L_1$ .	$\Delta L_2$ .	$\Delta \pi$ .	$\Delta \Omega$ .	$\Delta i$ .	$\Delta \phi$ .	$40 \Delta \mu$ .
Apr. 16	+ 0°77	+ 0°08	- 3°14	+ 0°15	- 0°10	- 0°31	- 0°176
May 6	0.00	0.00	0.00	0.00	0.00	0.00	0.000
26	- 1.03	+ 0.05	+ 2.40	- 0.06	+ 0.05	- 1.03	+ 0.077
June 15	- 2.06	+ 0.12	+ 3.15	- 0.06	+ 0.05	- 0.63	+ 0.036
July 5	- 2.85	+ 0.08	+ 1.80	- 0.06	- 0.02	- 1.33	- 0.118
25	- 3.17	- 0.15	- 1.48	- 0.12	- 0.12	- 1.99	- 0.355
Aug. 14	- 2.96	- 0.64	- 5.85	- 0.23	- 0.22	- 2.41	- 0.625
Sept. 3	- 2.23	- 1.39	- 10.11	- 0.36	- 0.30	- 2.44	- 0.865
23	- 1.14	- 2.34	- 13.09	- 0.41	- 0.32	- 2.11	- 1.029
Oct. 13	+ 0.06	- 3.41	- 14.04	- 0.34	- 0.30	- 1.56	- 1.083
Nov. 2	+ 1.13	- 4.47	- 12.69	- 0.10	- 0.24	- 0.97	- 1.016
22	+ 1.89	- 5.40	- 9.31	+ 0.26	- 0.16	- 0.55	- 0.833
Dec. 12	+ 2.21	- 6.11	- 4.74	+ 0.64	- 0.10	- 0.41	- 0.569